ACOUSTIC TELEMETRY EVALUATION OF JUVENILE FISH-PASSAGE EFFICIENCY AND SURVIVAL ASSOCIATED WITH SURFACE-SPILL TREATMENTS AT JOHN DAY DAM IN 2010

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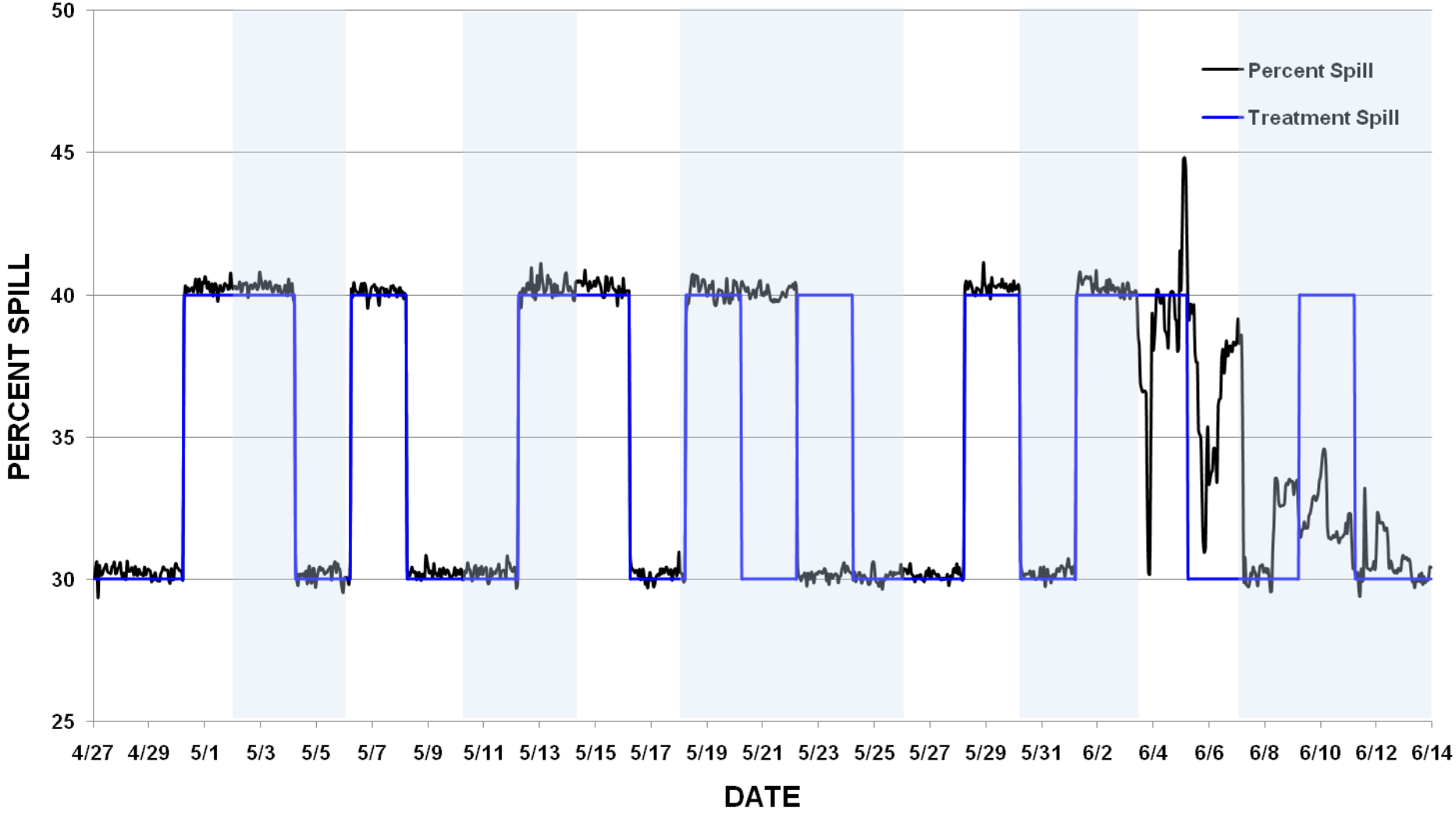
Objectives

- **SPRING** (Yearling Chinook and Steelhead)
  - Compare survival rates associated with 30 and 40% spill treatments
    - Two 2-day treatments within 4 day blocks
    - Calculate single release survival estimates from concrete at JDA to The Dalles Dam
  - Evaluate passage efficiency of the spillway and two top-spill weirs (TSW) in spill bays 18 and 19
  - Evaluate survival of smolt passing at spillbay 20 with a modified deflector

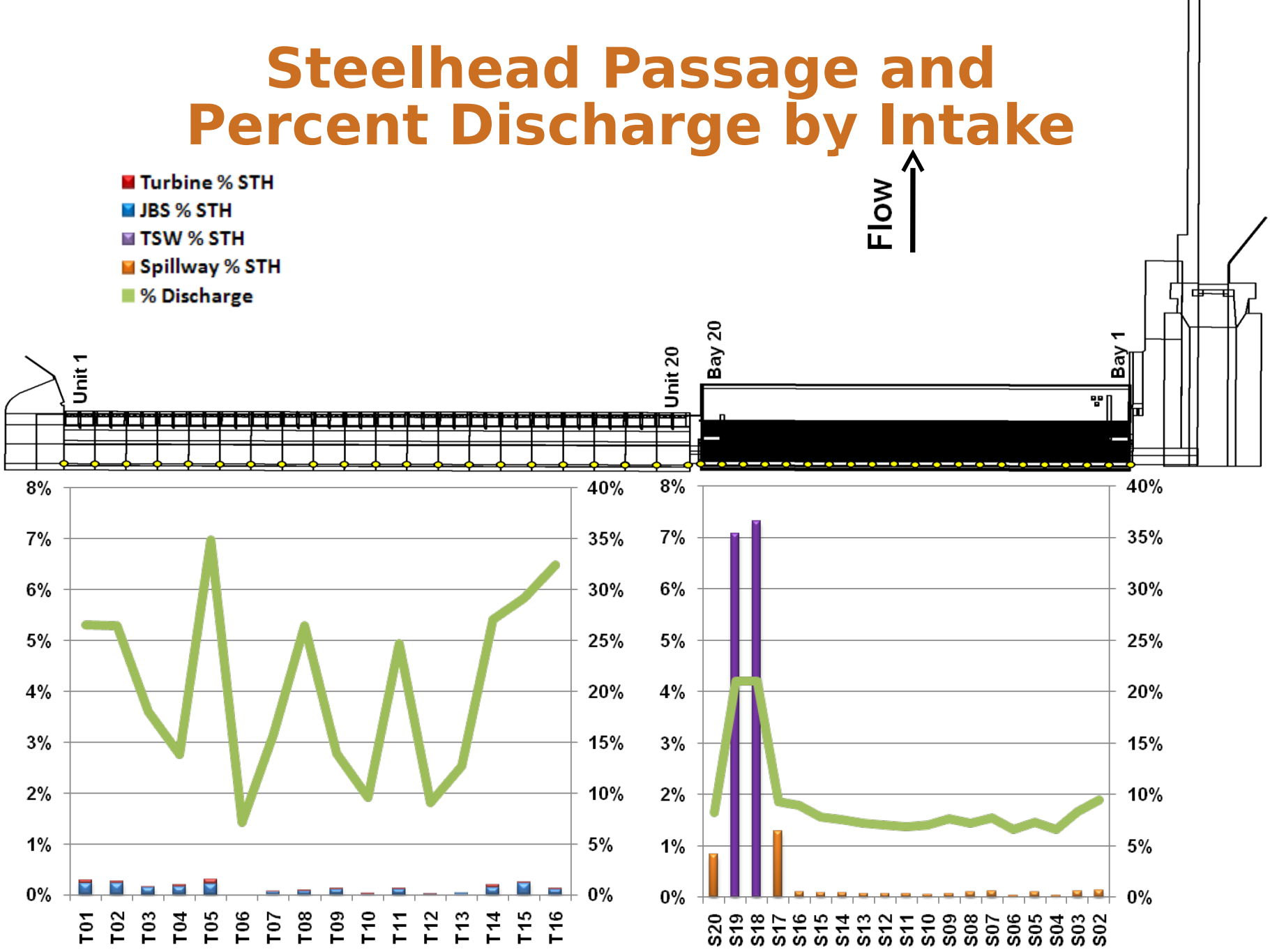
Objectives

- **SUMMER** (Subyearling Chinook)
  - Compare survival rates associated with 30 and 40% spill treatments
    - Two 2-day treatments within 4 day blocks
    - Calculate single release survival estimates from concrete at JDA to The Dalles Dam
  - Evaluate passage efficiency of the spillway and two top-spill weirs (TSW) in spill bays 18 and 19
  - Evaluate survival of smolt passing at spillbay 20 with a modified deflector

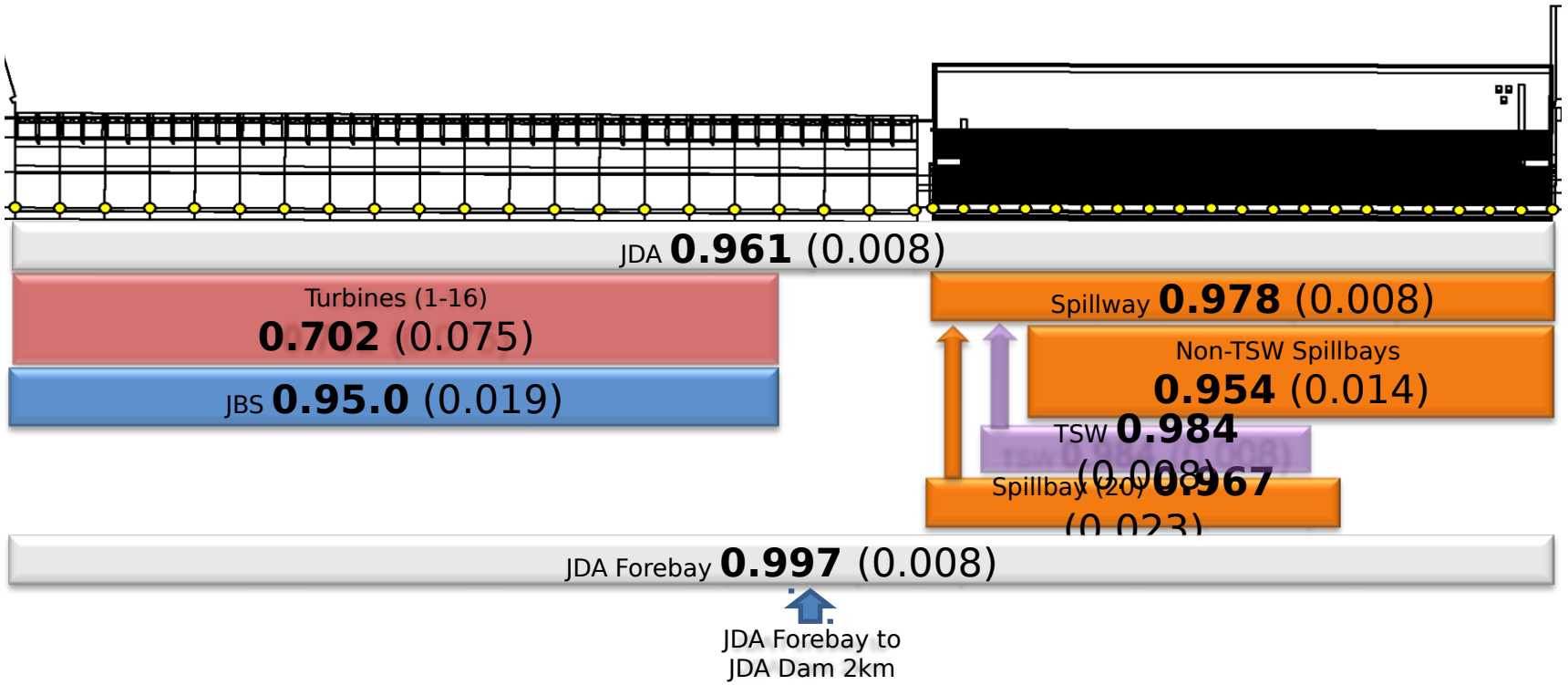
Spring Spill Treatments



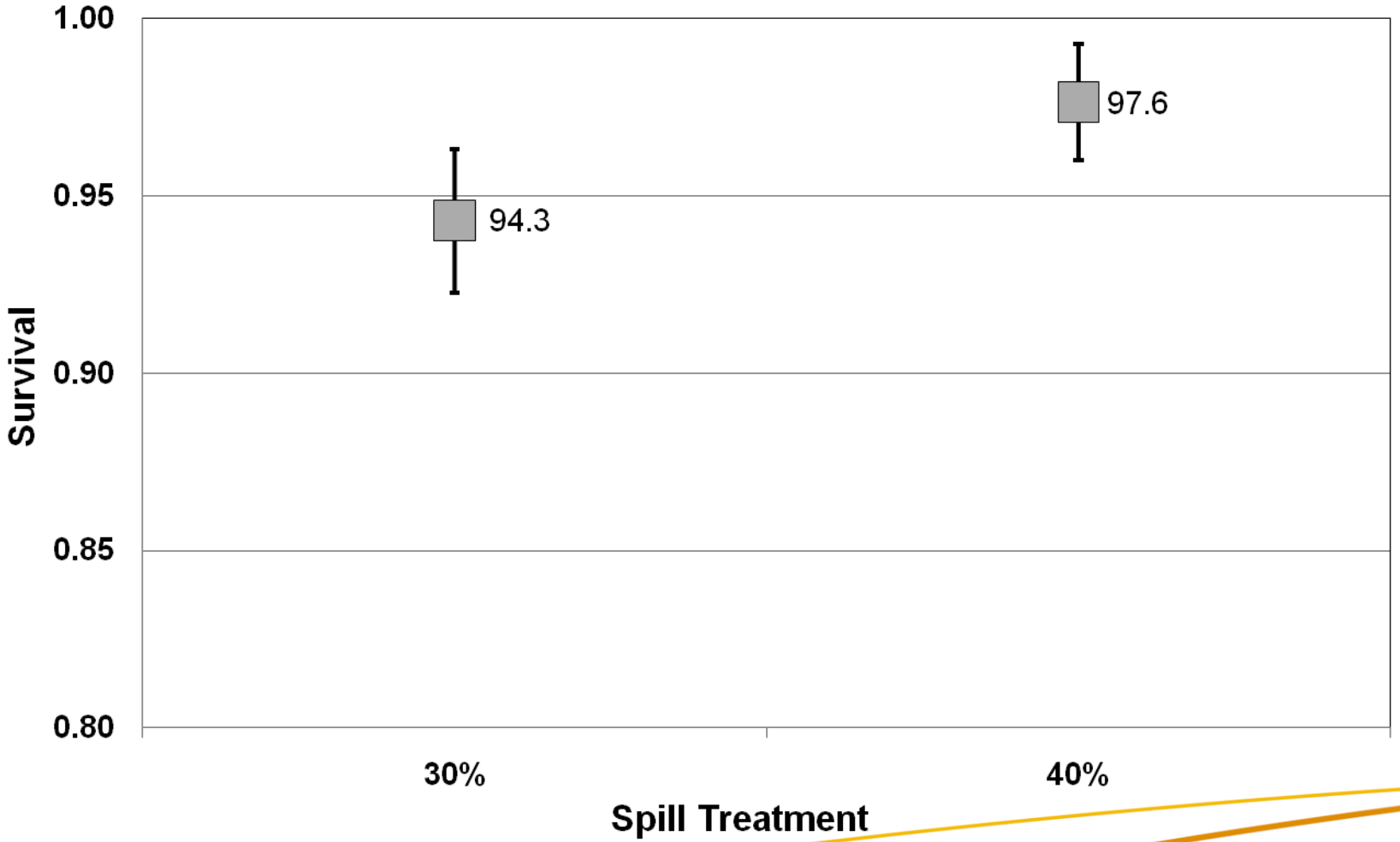
Steelhead Passage and Percent Discharge by Intake



Steelhead Survival by Route
(Single Release Estimate)



Steelhead Survival by Treatment



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Steelhead Passage Metrics

Metrics	All	30%	40%
Spill Passage Efficiency (SPE)	88.7%	87.1%	90.2%
Fish Passage Efficiency (FPE)	98.2%	98.2%	98.2%
Fish Guidance Efficiency (FGE)	83.8%	85.7%	81.6%
Surface Outlet Efficiency (SOE)	71.8%	75.2%	69.0%
Bypass Efficiency (BPE)	9.4%	11.1%	8.0%

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Steelhead Survival and Passage Metrics 2008, 2009 and 2010

	2010	2009	2008	2008*
Passage survival	96.1	95.3	95.9	98.6
30% spill survival	94.3	96.1	-	99.1
40% spill survival	97.6	94.6	-	97.2
Forebay survival	99.7	98.8	99.3	-
Non-TSW survival	95.4	93.6	95.9	98.5
TSW-bay survival	98.4	96.3	96.5	99
JBS survival	95.3	96.6	97.5	10
Turbine survival	72.7	82.3	72.9	74.9

*Paired release survival estimates.

	2010	2009	2008
FPE	98.2	97.4	97.2
FGE	83.8	89.0	88.9
SPE	88.7	76.3	74.4
SOE	71.8	50.1	49.6
BPE	9.4	21.1	22.7

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Steelhead Residence Time

Residence Time	All	30%	40%
Forebay Residence Time (hr)	1.37	1.73	1.25
Egress Time (hr)	0.53	0.53	.52
Passage Time (hr)	2.59	2.67	2.38

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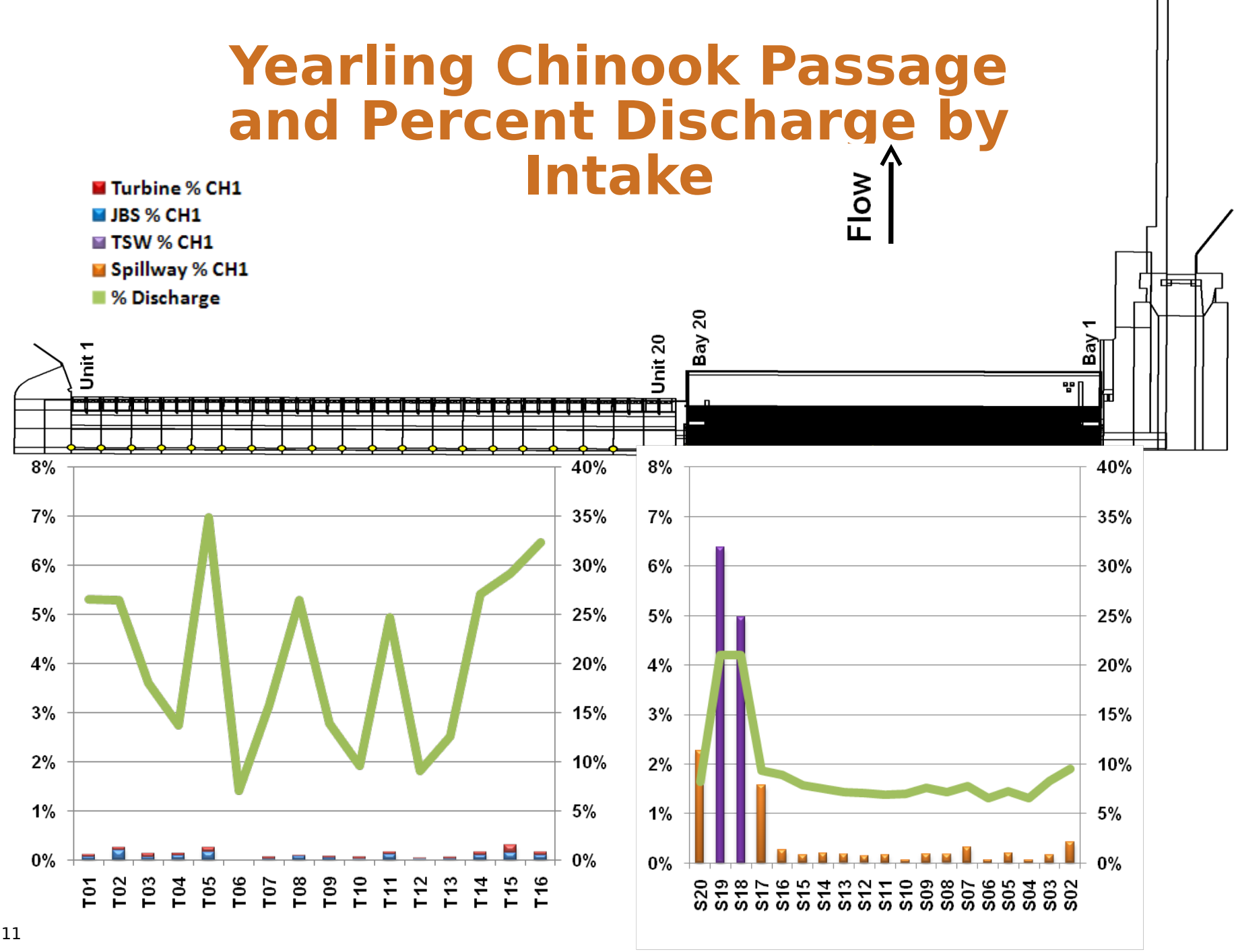
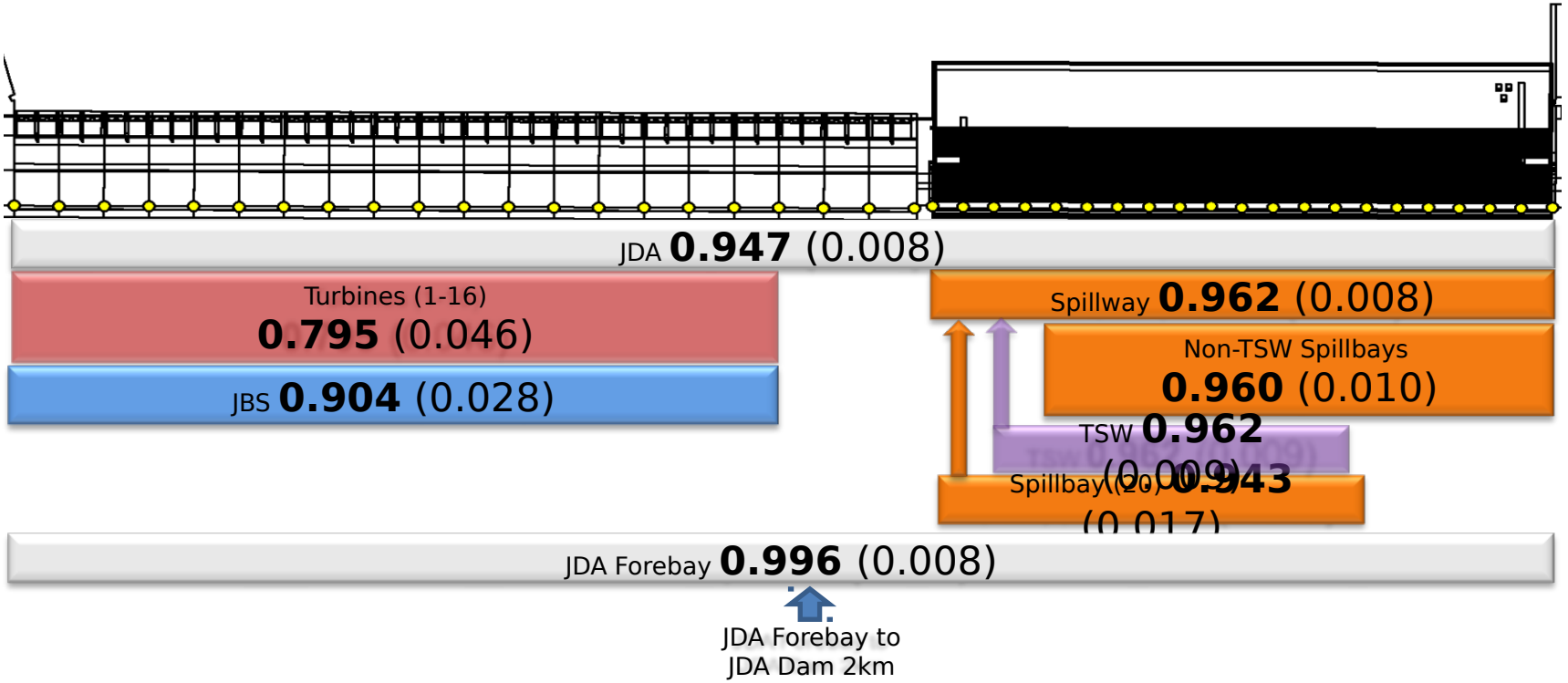
Yearling Chinook Passage and Percent Discharge by Intake



Yearling Chinook Survival by Route

(Single Release Estimat



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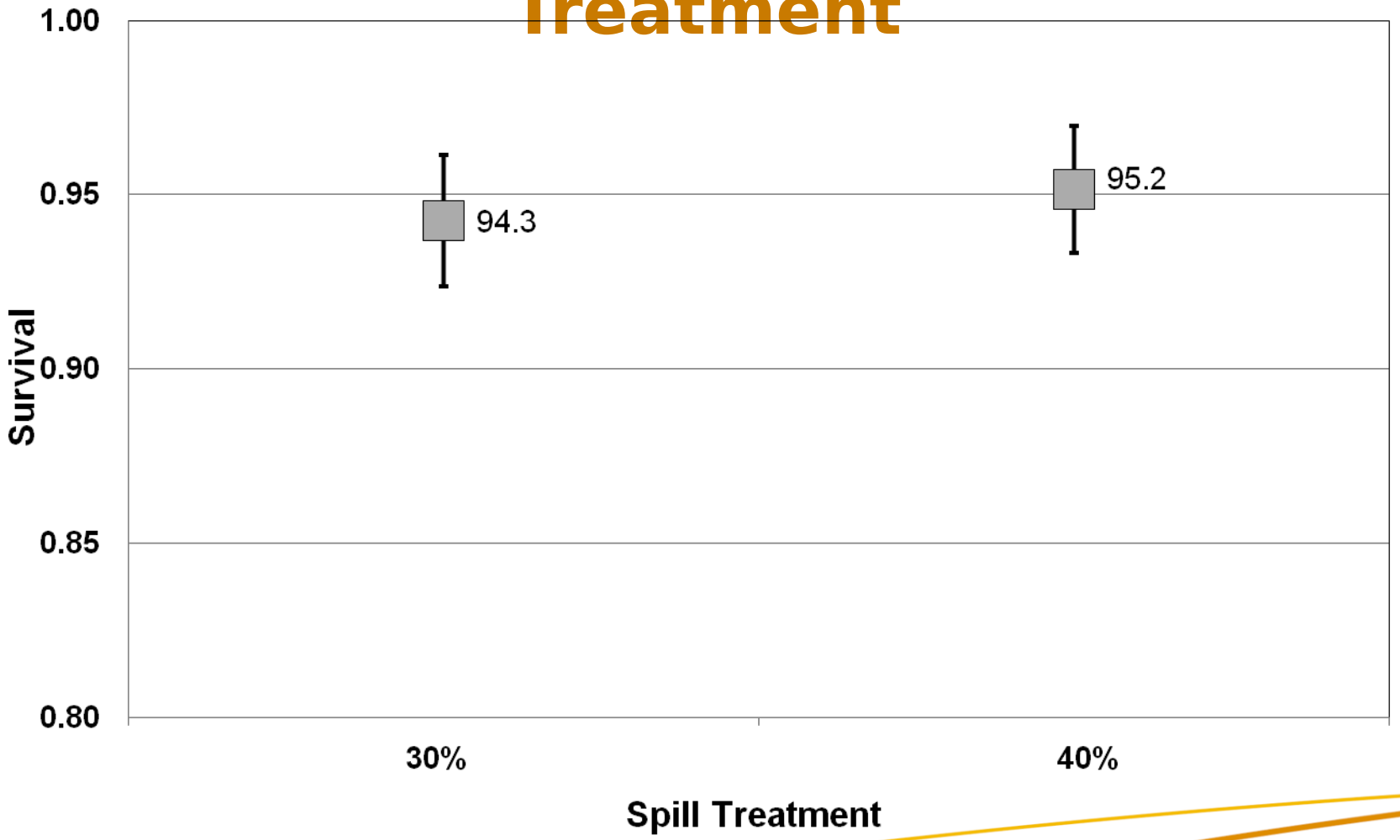
Yearling Chinook Survival by Treatment



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Yearling Chinook Passage Metrics

Metrics	All	30%	40%
Spill Passage Efficiency (SPE)	89.8%	*91.7%	*88.0%
Fish Passage Efficiency (FPE)	96.3%	96.9%	95.9%
Fish Guidance Efficiency (FGE)	64.0%	62.5%	65.4%
Surface Outlet Efficiency (SOE)	56.7%	66.2%	47.6%
Bypass Efficiency (BPE)	6.5%	5.2%	7.8%

*Significant difference

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Yearling Chinook Survival and Passage Metrics 2008, 2009, and 2010

	2010	2009	2008	2008*
Passage survival	94.7	92.7	94.4	95.7
30% spill survival	94.3	93.0	-	95.5
40% spill survival	95.2	92.4	-	95.6
Forebay survival	99.6	99.5	100.0	-
Non-TSW survival	96.0	91.2	95.1	96.6
TSW bay survival	96.2	95.1	94.8	96.1
JBS survival	90.4	97.5	96.3	97.6
Turbine survival	79.5	85.1	84.4	85.5

*Paired release survival estimates.

	2010	2009	2008
FPE	96.3	93.4	92.1
FGE	64.0	66.2	66.9
SPE	89.8	80.6	76.2
SOE	56.7	27.1	23.6
BPE	6.5	12.8	15.9

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Yearling Chinook Residence Time

Residence Time	All	30%	40%
Forebay Residence Time (hr)	0.57	0.69	0.57
Egress Time (hr)	0.60	0.60	0.60
Passage Time (hr)	2.19	2.30	1.93

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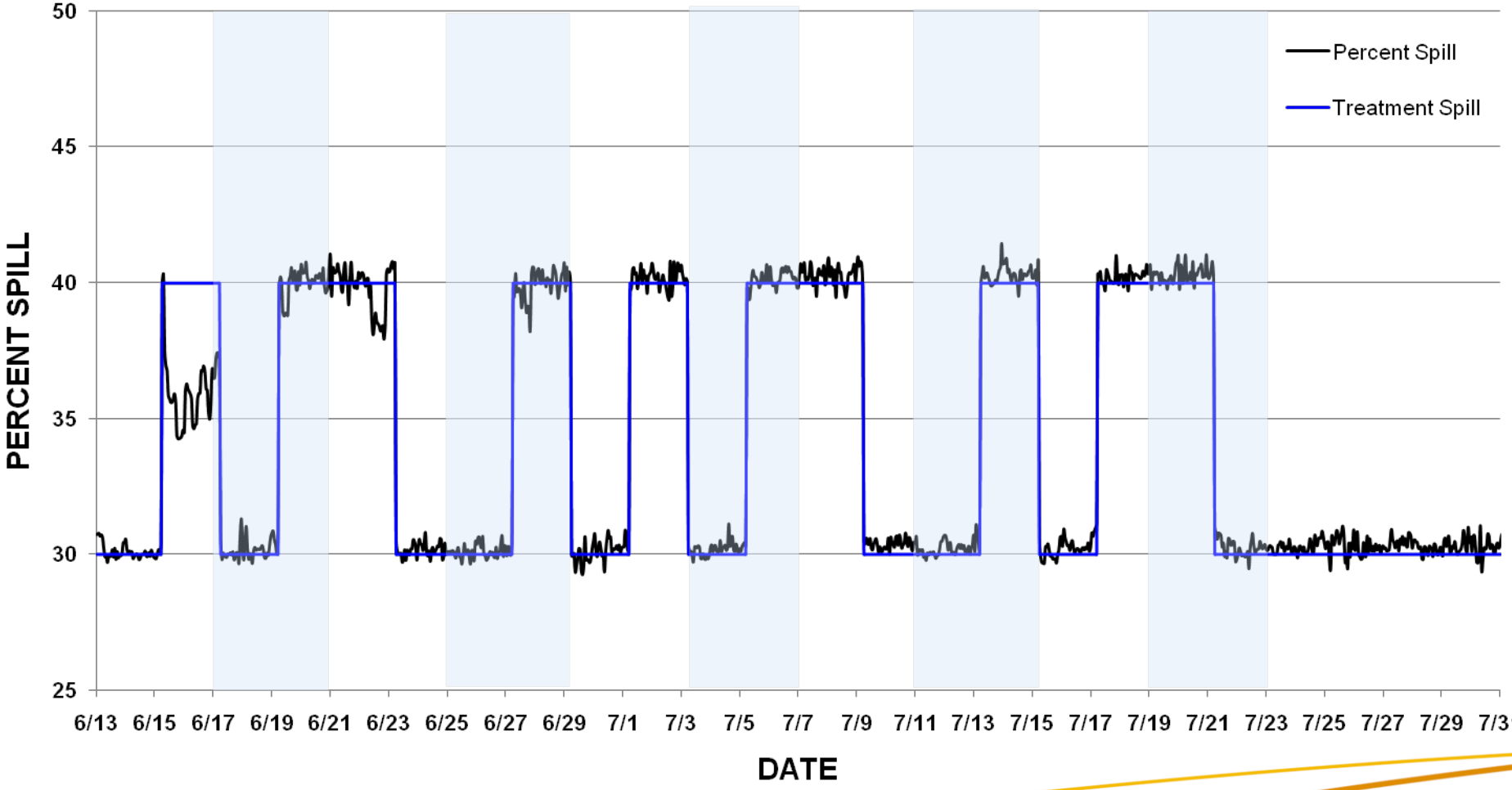
Summer Spill Treatments



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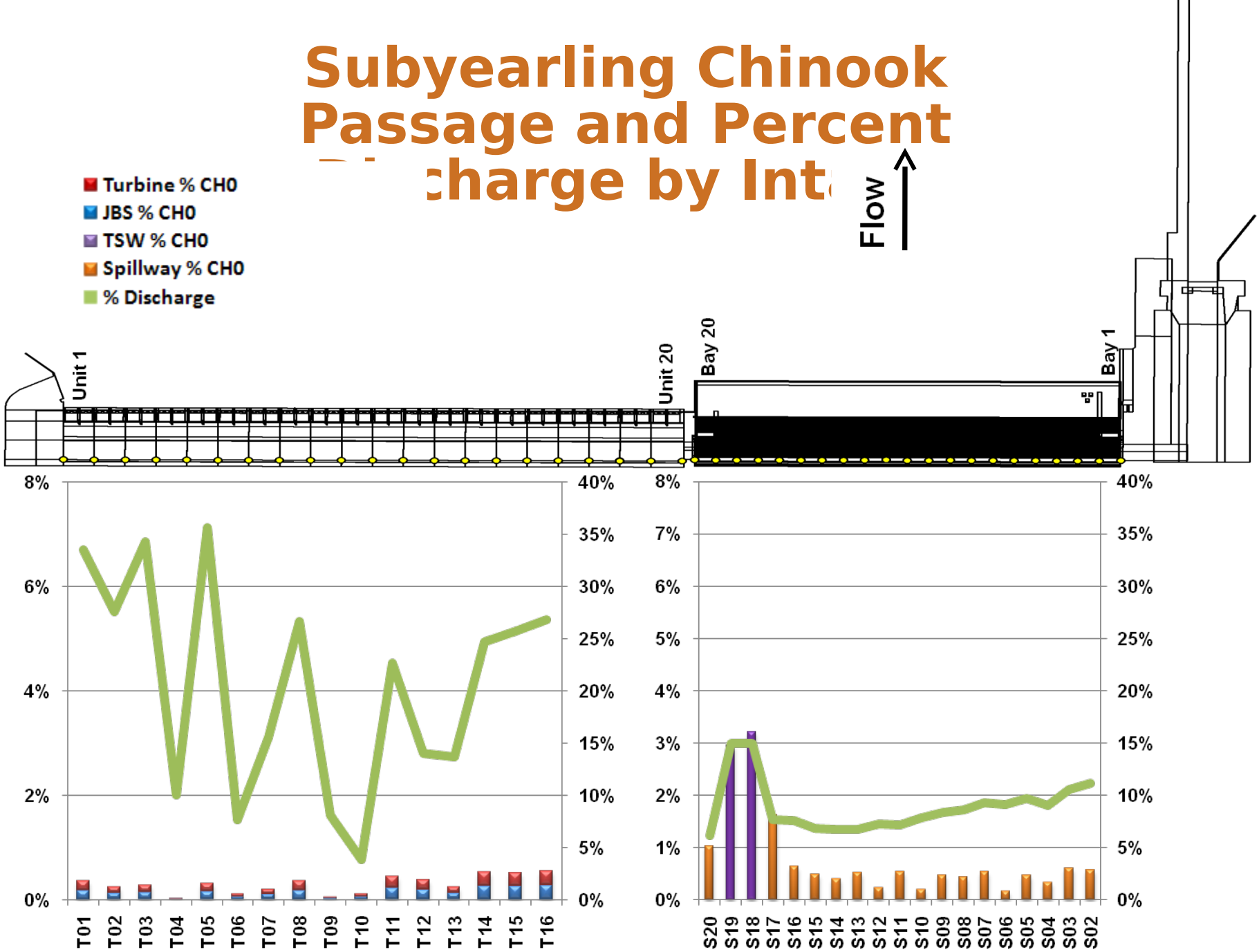
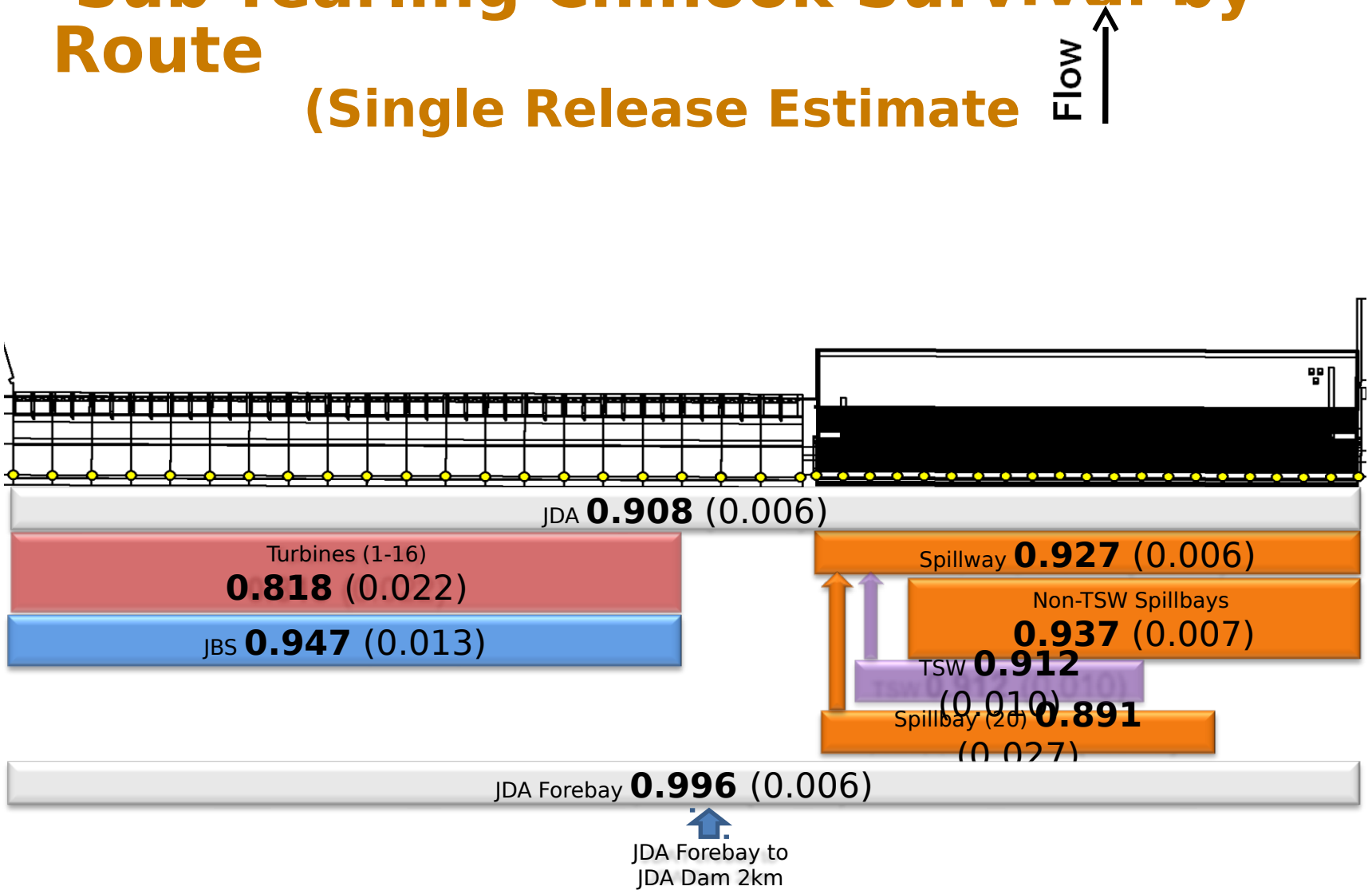
Subyearling Chinook Passage and Percent Discharge by Int



Sub-Yearling Chinook Survival by Route

(Single Release Estimate



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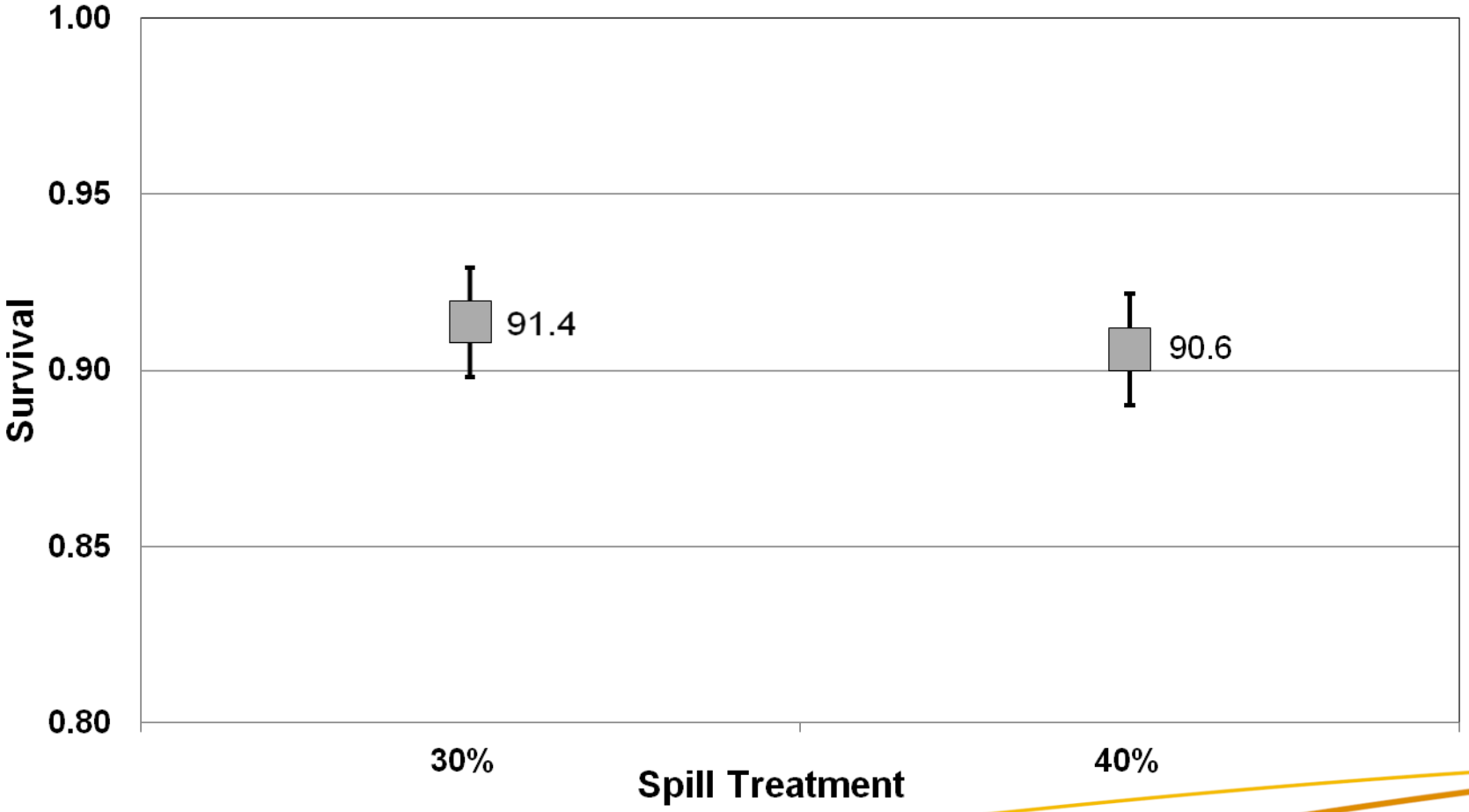
Subyearling Chinook Survival by Treatment



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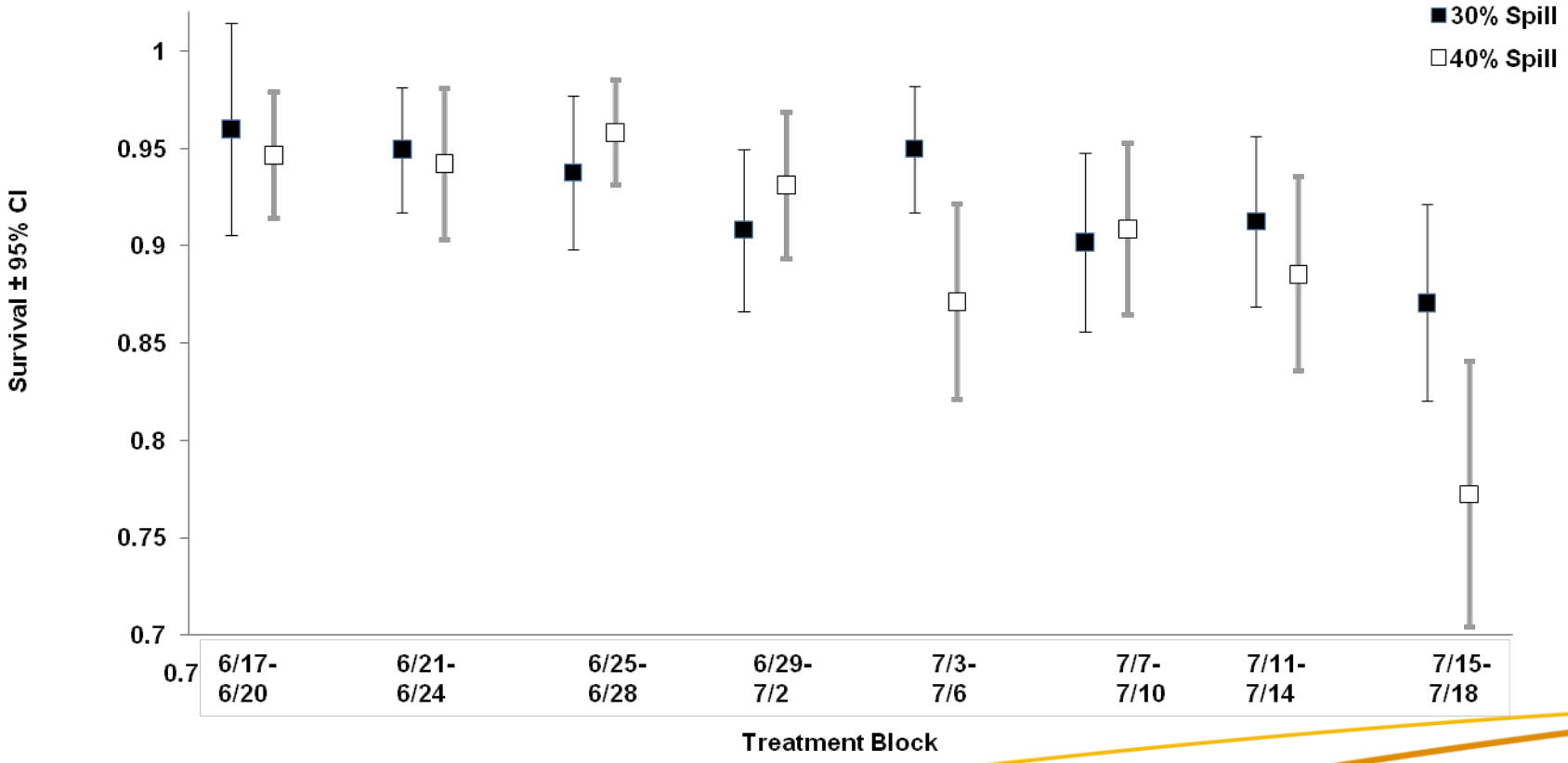
Subyearling Chinook Survival by Treatment and Block



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Subyearling Chinook Passage Metrics

Metric	All	30%	40%
Spill Passage Efficiency (SPE)	77.6%	*74.1%	*81.0%
Fish Passage Efficiency (FPE)	88.3%	*85.8%	*90.8%
Fish Guidance Efficiency (FGE)	47.8%	45.1%	51.4%
Surface Outlet Efficiency (SOE)	31.1%	35.2%	27.2%
Bypass Efficiency (BPE)	10.7%	11.7%	9.7%

*Significant difference

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Subyearling Chinook Survival and Passage Metrics 2008, 2009, and 2010

	2010	2009	2008	2008*
Passage survival	90.8	83.9	84.4	86.1
30% spill survival	91.4	84.6	-	85.2
40% spill survival	90.6	83.3	-	86.6
Forebay survival	99.6	99.5	99.5	-
Spillway survival	92.7	84.7	82.7	84.4
TSW-bay survival	91.2	-	91.0	92.7
JBS survival	94.7	90.8	95.4	97.3
Turbine survival	81.8	74.9	71.4	72.8

*Paired release survival estimates.

	2010	2009	2008
FPE	88.3	84.5	83.3
FGE	47.8	42.2	46.8
SPE	77.6	76.3	68.6
SOE	31.1	-	20.6
BPE	10.7	11.3	14.7

Subyearling Chinook Residence Time

Residence Time	All	30%	40%
Forebay Residence Time (hr)	0.26	0.33	0.22
Egress Time (hr)	0.53	0.53	0.51
Passage Time (hr)	1.88	1.94	1.77

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Summary

- There was not a significant difference in survival between 30% and 40% spill treatments for steelhead, yearling Chinook or subyearling Chinook
- BiOp survival criteria (single release estimates to TDA)
  - Steelhead 96.1% - yes
  - Yearling Chinook 94.7% -no
  - Subyearling Chinook 90.8% - no
- Spill passage efficiency (SPE)
  - Significantly greater in spring for both steelhead and yearling Chinook
  - No significant difference for subyearling Chinook
- Surface outlet efficiency (SOE) i.e.TSW efficiency
  - Significantly greater in spring for both steelhead and yearling Chinook
  - No significant difference for subyearling Chinook

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Summary

- Minor tag-life correction for steelhead and yearling Chinook
- No tag-life correction for subyearling Chinook

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Conclusion

- Not a significant difference in survival between 30% and 40% treatments
- TSW's in spillbays 18 and 19
  - Improved passage and survival in spring (surface oriented fish)
  - Attracted subyearling Chinook in summer but lower survival rates than unmodified spillbays (oriented deeper)
- Modified spillbay 20
  - Survival at spillbay 20 with modified deflector not as high as unmodified spillbays (better than 2008 and 2009 in spring, possibly due to hydraulic conditions

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